IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Letters Patent of:
Koji Arimura et al.

Patent No.: 7,142,692

Issued: November 28, 2006

For: REPRODUCTION EQUIPMENT,
REPRODUCTION EQUIPMENT SPECIFYING
EQUIPMENT, REPRODUCTION
EQUIPMENT SPECIFYING SYSTEM AND
METHODS, AND RECORDING MEDIA FOR
SAID EQUIPMENT AND SYSTEM

REQUEST FOR CERTIFICATE OF CORRECTION
PURSUANT TO 37 CFR 1.323 AND 1.322

Attention: Certificate of Correction Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Upon reviewing the above-identified patent, Patentee noted typographical errors which should be corrected. A listing of the errors to be corrected is attached.

The typographical errors marked with an "A" on the attached list are found in the application as filed by applicant. Please charge our Credit Card in the amount of $100.00 covering the fee set forth in 37 CFR 1.20(a).

The typographical errors marked with a "P" on the attached list are not in the application as filed by applicant. Also given on the attached list are the documents from the file history of the subject patent where the correct data can be found.

         The errors now sought to be corrected are inadvertent typographical errors the correction of which does not involve new matter or require reexamination.

         Transmitted herewith is a proposed Certificate of Correction effecting such corrections. Patentee respectfully solicits the granting of the requested Certificate of Correction.

         The Commissioner is authorized to charge any deficiency of up to $300.00 or credit any excess in this fee to Deposit Account No. 04-0100.

Dated: February 16, 2007   Respectfully submitted,

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

Page _1_ of _1_

PATENT NO.   :   7,142,692

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INVENTOR(S)   :   Koji Arimura et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 3; Line 56; Delete "used-in" and insert - - used in - -, therefor.

Column 5; Line 53 (Approx.); After "medium" delete "l" and insert - - 1 - -, therefor.

Column 7; Line 46; After "table" insert - - . - -.

Column 12; Line 2; In Claim 3, delete "said" before "signal".

Column 14; Line 9; In Claim 16, insert - - computer readable - - before "medium,".

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Sr. No.	P/A	Original		Issued Patent		Description Of Error
		Page	Line	Column	Line	
1	P	Page 6 Specification (08/29/2001)	22	3	56	Delete "used-in" and insert - - used in - -, therefor.
2	P	Page 10 Specification (08/29/2001)	19	5	53 (Approx.)	After "medium" delete "I" and insert - - 1 - -, therefor.
3	A	Page 14 Specification (08/29/2001)	14	**7**	46	After "table" insert - - . - -.
4	P	Page 3 Claims (09/21/2005)	Claim 4 Line 6	12	2	In Claim 3, delete "said" before "signal".
5	P	Page 2 Notice of Allowance and Fees Due (PTOL-85) (02/24/2006)	14 (Examiner's Amendment)	14	9	In Claim 16, insert - - computer readable - - before "medium,".

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A second object of this invention is to provide an art by which the embedded digital watermark can be extracted with high precision.

In some cases, people who illegally copy AV signals intentionally disable the extraction of the information embedded as a digital watermark. For example, the signal sequence is interchanged or a part of the signals is removed. When such processing is performed, the embedded digital watermark cannot be extracted correctly by the prior art.

A third object of this invention is to provide an art by which a digital watermark can be extracted without fail even when a third party processes the AV signals.

In some cases, people who perform illegal copying analyze the embedded information or embedding method and intentionally embed a false digital watermark. With the prior art, the protection of the copyright is insufficient when a third party is successful in analyzing the embedded information.

A fourth object of this invention is to provide an art that contains a countermeasure for cases where a third party is successful in analyzing the digital watermark.

A first mode of this invention provides a reproduction equipment comprised of a digital watermark generating means, which generates, as a digital watermark, attribute information that enables the identifying the reproduction equipment; a digital watermark embedding means, which generates watermark-embedded AV signals with which the digital watermark generated by the digital watermark generating means is embedded in AV signals; and an output means, which outputs the watermark-embedded AV signals to the exterior.

With the above arrangement, a reproduction equipment that was used for illegal copying can be identified specifically by means of the digital watermark that is extracted from illegally copied AV signals. That the owner, etc. of the identified reproduction equipment has been involved in illegal copying can thus be claimed. A system for copyright protection can thus be established to prevent illegal copying.

With a second mode of this invention, a reproduction equipment identification code is converted into a plurality of signal sequences using a correspondence table in the reproduction equipment. The plurality of signal sequences obtained are embedded as a digital watermark in the AV signals during reproduction. With a reproduction equipment specifying equipment, the values of correlation between the AV signals in which the digital watermark was embedded and all of the signal sequences contained in the correspondence table are determined and compared with a previously set threshold value to determine the embedded signal sequences. The identification code of the reproduction equipment can thus be established using a plurality of signal sequences obtained from AV signals of at least a fixed length of time T.

With this arrangement, the identification code of the reproduction equipment used-in the copying process can be extracted from the illegally copied AV signals to enable detection and prevention of illegal copying.

With a third mode of this invention, the signal sequences with which the cross correlation values are smaller than a previously set value (threshold value of cross correlation) are used as the signal sequences to be embedded.

With this arrangement, the precision of extraction of the embedded signal sequences by the reproduction equipment specifying equipment is improved and the precision of extraction of the identification code is improved. Identification of the reproduction equipment is thus enabled.

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With a fourth mode of this invention, a plurality of signal sequences are embedded randomly by the reproduction equipment so that they will be embedded at the same proportion per fixed time T.

With this arrangement, even where people that perform illegal copying perform the process of extracting parts of the AV signals at fixed intervals, the identification code can be extracted without fail from the illegally copied AV signals to enable identification of the reproduction equipment.

With a fifth mode of this invention, the identification code is converted into a bit string. A signal sequences corresponding to the "1"s or the "0"s of the bit string are embedded by the reproduction equipment. The order of the embedded signal sequences does not require a meaning.

With this arrangement, even where people that perform illegal copying change the temporal sequence of the AV signals, the identification code can be extracted without fail from the illegally copied AV signals to enable identifying of the reproduction equipment.

With a sixth mode of this invention, the contents of the correspondence table that are held in the reproduction equipment and the reproduction equipment specifying equipment are changed to be always the same by means of a correspondence table changing signal.

With this arrangement, even in the case where the embedded signal sequences are leaked to a third party, new signal sequences can be embedded by changing the correspondence table to enable identifying of the reproduction equipment.

The above, and other objects, features and advantages of the present invention will become apparent from the following description read in conjunction with the accompanying drawings, in which like reference numerals designate the same elements.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a reproduction equipment specifying system of an embodiment of this invention.

FIG. 2 is a block diagram of the reproduction equipment of the invention.

FIG. 3 is a block diagram of the reproduction equipment specifying equipment of the invention.

FIG. 4 is a flowchart for the reproduction equipment of the invention.

FIG. 5 is a flowchart for the identification code generating unit of the invention.

FIG. 6 is an example diagram of a correspondence table of the identification code bit positions and signal sequences of the invention.

FIG. 7 is an explanatory diagram of the identification code bit positions of the invention.

FIG. 8 is a flowchart for the digital watermark embedding unit of the invention.

FIG. 9 is an explanatory diagram which shows an example of embedding signal sequences in video signals by the invention.

FIG. 10 is a flowchart for the reproduction equipment specifying equipment of the invention.

FIG. 11 is a flowchart for the identification code judgment unit of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1 a reproduction equipment specifying system of the embodiment of this invention includes a

reproduction equipment 3 having an AV reproduction means 31. AV reproduction means 31 is of a type capable of reproducing AV data moving in a direction N1 from an original recording medium 1. The AV signals from AV signal reproduction means 31 are applied to a digital watermark embedding means 33. A digital watermark generating means 32 applies a digital watermark to digital watermark embedding means 33. The digital watermark indicates attribute information by which the recording equipment 3 can be specified. The method of generating the digital watermark may be any conventional method, such as that described in the book introduced in the section on the related arts. What is important is that reproduction equipment 3 can be specified by this attribute information.

The resulting watermark-embedded AV signals are applied to an output means 34. Output means 34 applies the watermark-embedded AV signals to a reproduction device 6 and to an AV signal recording equipment 4. A copier 10 reproduces the data on original recording medium 1 using the output of reproduction equipment 3. In addition, AV signal recording equipment 4 duplicates the performance of illegal copying onto a copy recording medium 2.

Copy recording medium 2 is then available as physical evidence of the illegal copying performed by copier 10 (represented by a stick figure of the person doing the copying).

A reproduction equipment specifying equipment 5 is used to prove the fact that copy recording medium 2 was prepared by copying using reproduction equipment 3. Reproduction equipment specifying equipment 5 includes an AV signal reproduction means 51 which receives the copied output of copy recording medium 2. The output of AV signal reproduction means 51 is watermark-embedded AV signals which are applied to a digital watermark extraction means 52. Digital watermark extraction means 52 derives the embedded digital watermark from the watermark-embedded AV signals, and applies the resulting digital watermark to a suitable reproduction device such as, for example, a printing means 53 for printing the digital watermark on paper. Printing means 53 may be any convenient human-understandable device such as, for example, a computer monitor, TV display. In some applications, a combination of display for immediate review, and a permanent printed record may be desired.

It is assumed in the following that copier 10 does not have a copyright for recording medium 1 and that copier 10 can be identified as an owner or user of reproduction equipment 3.

The form of the signal in original recording medium 1 and copy recording medium 2 is arbitrary and may be either analog or digital. The form of recording medium of recording medium 1 and copy recording medium 2 is also arbitrary and may be selected freely from among disks, tapes, hard disks, etc.

In general, reproduction equipment 3 may be of a type that is distributed in large numbers in the market while reproduction equipment specifying equipment 5 is generally owned by an organization that controls the copyright for recording medium 1 or by the police or other authority that exercises control over copyright violations.

Although, for purposes of illustration, reproduction equipment 3 and reproduction equipment specifying equipment 5 are shown at the same location, reproduction equipment 3 and reproduction equipment specifying equipment 5 normally exist in separate locations. Usually, these equipments also differ in their time of use.

With the system of this invention, illegal copying by copier 10 can be proven by the process to be described below.

With the system shown in FIG. 1, when copier 10 performs illegal copying, copier 10 sets original recording medium 1 in reproduction equipment 3, connects reproduction equipment 3 to AV signal recording equipment 4 with a cable, etc., and sets copy recording medium 2 in AV signal recording equipment 4.

Copier 10 also connects reproduction equipment 3 or AV signal recording equipment 4 to a reproduction device 6 to monitor the AV signals.

If the AV signals contain both sound and images, reproduction device 6 may be television equipment. If the AV signals contain only sound, reproduction device 6 may be an amplifier and speaker (or headphone), etc.

As was mentioned above, the AV signals may be either analog or digital signals, and a reproduction device 6 that is compatible with the form of AV signals used will be used.

If copier 10 considers monitoring to be unnecessary, reproduction device 6 may be omitted.

Even if copier 10 monitors the AV signals using reproduction device 6, since the digital watermark data are embedded in the AV data in a manner that is imperceptible to the viewer or listener as was mentioned above, copier 10 cannot normally notice that a digital watermark is being embedded in the monitored AV signals.

The present invention does not degrade the quality of AV signals by the digital watermark as in the prior art described in the abovementioned patent publication. Thus if copier 10 simply monitors the AV data recorded in recording medium 1 without performing illegal copying, the monitored AV signals will retain good quality.

This invention thus excels over the art of the abovementioned patent publication in the point that good quality is maintained as long as only legitimate monitoring is performed.

It can be readily understood that, when it is clear that the digital watermark extracted from copy recording medium 2 indicates attribute information unique to reproduction equipment 3, the suspicion that copier 10, whose connection as the owner, etc. of reproduction equipment 3, is involved in the illegal preparation of copy recording medium 2 becomes provable.

Thus with this invention, by embedding attribute information unique to reproduction equipment 3 as a digital watermark in the reproduced AV signals, the copyright of recording medium 1 can be protected effectively.

From the standpoint of copier 10, since copier 10 cannot perceive that a digital watermark is being embedded even if he/she monitors the AV signals on means of reproduction device 6, the evidence of illegal copying is inscribed in copy recording medium 2 without the knowledge of copier 10.

A copier 10 who comes to know of these circumstances will thereafter be discouraged to perform illegal copying heedlessly due to his/her understanding of the likelihood of exposure of participation in the illegal deed.

This invention can thus restrain illegal copying.

A representative form of coded AV signals is now taken up as an example of the AV signals recorded in recording medium 1 and a preferable embodiment for this type of AV signals is now described in detail.

Referring to FIG. 2, AV reproduction equipment 3 includes AV reproduction means 31, as previously described. AV reproduction means 31 includes a coded signal input unit 101 which feeds a coded signal to a decoding unit 102.

An identification code generating unit 103 receives the output of decoding unit 102. An identification code generating unit 103 applies its output to digital watermark embedding unit 104. The output of digital watermark embedding unit 104 is applied to the input of an output unit 105. Identification code generating unit 103 receives a correspondence table changing signal whose nature and function is described in detail later in this specification.

With the present example, the coded signal input unit 101 and decoding unit 102 correspond to being the AV signal reproduction means 31 of FIG. 1. Also, the identification code generating unit 103 corresponds to being the digital watermark generating means 32, digital watermark embedding unit 104 corresponds to being the digital watermark embedding means 33, and output unit 105 corresponds to being the output means 34.

Referring now to FIG. 3, AV signal reproduction means 51 contains an input unit 201 which feeds its output to a correlation value calculation unit 203 in watermark extraction means 52. A signal sequences recording unit 202 feeds its output to correlation value calculation unit 203. Signal sequences recording unit 202 receives a correspondence table changing signal, to be described later. The output of correlation value calculation unit 203 is fed to an input of a comparison unit 205. The output of comparison unit 205 is applied to an input of an identification code judging unit 206. The output of identification code judging unit 206 is fed to an identification code output unit 207 in printing means 53.

With the present example, input unit 201 corresponds to the AV signal reproduction means 51 of FIG. 1, the signal sequences recording unit 202, correlation value calculation unit 203, threshold value setting unit 204, comparison unit 205, and identification code judgment unit 206 correspond to the digital watermark extraction means 52, and identification code output unit 207 corresponds to the printing means 53.

The correlation value calculation unit 203 determines correlation values $S(k)$ defined as follows:

$$S(k) = \Sigma\{X(k) \times N(k)\} \ (i=1, 2, \ldots, l)$$

where: X: the AV signal sequences that is input

N: all of the signal sequences in the correspondence table; e.g. $N(k)$ $k=1, 2, \ldots, m$

m: the number of signal sequences in the correspondence table□

The reproduction method by which an identification code is embedded as a digital watermark in the AV signals is now described with reference to the flowchart of FIG. 4 which illustrates the process performed by the reproduction equipment of FIG. 2 in embedding the identification code as a digital watermark.

Coded signal input unit 101 acquires a coded AV signals by readout from a recording medium (for example, a DVD, DV, HDD, etc.), receiving of a broadcast, or downloading from a network (for example, the Internet). Coded signal input unit 101 sends the coded AV signals to decoding unit 102 (step 301). Decoding unit 102 then decodes the coded AV signals in accordance to the rules of compression, transmission protocol, etc. and generates base-band AV signals (step 302).

The process of identification code generating unit 103 (step 303) is now described with reference to the flowchart of FIG. 5, which illustrates the flow of the process performed by identification code generating unit 103.

Identification code generating unit 103 prepares, as attribute information unique to the reproduction equipment,

an identification code from or by combining the equipment ID of the reproduction equipment, the card ID of an IC card connected to the reproduction equipment, the user ID of a user, the raw material ID of the AV signals, the medium ID of the recording medium in which the AV signals are stored, and the reproduction date and time (step 401).

For example, the equipment ID of the reproduction equipment is set to "152". In this example, the number "152" is used as the identification code.

This identification code is then converted into a binary bit string consisting of "0"s and "1"s (step 402). When the equipment code "152" is converted into a bit string, it becomes "10011000".

The signal sequences corresponding to the bit positions of the bit-converted identification code at which the bit value is 1 are searched from a previously prepared correspondence table (step 403).

FIG. 6 shows a correspondence table of the identification code bit positions and the signal sequences. FIG. 7 shows the identification code bit positions.

With the bit-string-converted identification code, "10011000", since the 4th bit, 5th bit, and 8th bit (reading from right to left) from the LSB take on a value of "1", the three signal sequences {N4, N5, N8} are found to correspond to the bit positions with a value of "1" by use of the correspondence table. Identification code generating unit 103 sends these signal sequences to digital watermark embedding unit 104 (step 404).

Although the identification code was converted to binary form in converting the identification code into a bit string, the method of conversion to a bit string is not limited thereto. For example, a code table for the ASCII code, etc. may be used instead.

Also, although signal sequences were prepared from bit positions of value "1" in the search for signal sequences from the correspondence table, the signal sequences may be prepared from bit positions of value "0" instead.

The process of digital watermark embedding unit 104 (step 304) is now described with reference to the flowchart of FIG. 8, which shows the flow of the process digital watermark embedding unit 104. Digital watermark embedding unit 104 embeds the plurality of signal sequences input from identification code generating unit 103 at the same proportion per fixed time T. This is done since the signal sequences can then be taken out conveniently at fixed proportions when AV signals of a fixed time T are taken out.

That is, the number of times EMAX by which each signal sequences is embedded in a fixed time T is set (step 701) and the number of times of embedding of each signal sequences is cleared to 0 (step 702).

One signal sequences is then selected randomly from among the signal sequences for which the number of times of embedding is not EMAX and the number of times of embedding of that signal sequences is incremented (step 703).

The selected signal sequence is then embedded as a digital watermark by a previously used method into a predetermined unit of the AV signals input from decoding unit 102 (step 704).

The processes from the selection of signal sequences of step 703 are then repeated until the number of times of embedding equals EMAX for all signal sequences. Then the next process is entered (step 705).

If the embedding process of step 703 to step 705 is to be repeated further, the process is repeated from the clearing of the number of times of embedding of step 702, otherwise the embedding process is ended (step 706).

thus obtained are embedded as a digital watermark at the same proportion per fixed time T.

Meanwhile, with the reproduction equipment specifying equipment, the correlation values of the AV signals in which the digital watermark was embedded and signal sequences contained in the correspondence table are determined and compared with a previously set threshold value to determine the validity of the embedded signal sequences.

The identification code of the reproduction equipment is then extracted from the plurality of signal sequences obtained from AV signals of a fixed time T or more.

Furthermore, the correspondence tables in the reproduction equipment and the reproduction equipment specifying equipment are changed simultaneously to the same contents. The signal sequences to be embedded can thus be changed even for the same identification code.

Having described preferred embodiments of the invention with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention as defined in the appended claims.

What is claimed is:

1. A reproduction equipment comprising:
a coded signal input unit operable to input coded AV ("audio, video, or audio video") signals;
a decoding unit operable to decode the coded AV signals inputted from said coded signal input unit, and further operable to generate AV signals to be reproduced;
an identification code generating unit operable to generate an identification code specifying the reproduction equipment;
a digital watermark embedding unit operable to input the AV signals to be reproduced from said decoding unit to embed the identification code generated by said identification code generating unit as a digital watermark into said AV signals to be reproduced, wherein a digital watermark embedded signal is generated;
an output unit operable to output the digital watermark embedded AV signals; and
said identification code generation unit is further operable to convert the identification code into a binary bit string, each position of a specific value bit of the binary bit string indicating a corresponding signal sequence among a plurality of signal sequences, and still further operable to output the binary bit string as an output of said identification code generating unit;
wherein an output of said identification code generating unit is composed of a binary bit string indicating a corresponding signal sequence among a plurality of signal sequences.

2. A reproduction equipment as set forth in claim 1, wherein said identification code is at least one of an equipment ID of said reproduction equipment, a card ID of an IC card connected to said reproduction equipment, a user ID of a user of the reproduction equipment, a raw material ID of said coded AV signals, a medium ID of a recording medium in which said coded AV signals are stored, and reproduction date and time, and an initial value of a signal sequence to be embedded among the plurality of the signal sequences as said digital watermark.

3. A reproduction equipment as set forth in claim 1, wherein said identification code generating unit is further operable to convert the identification code into the binary bit string utilizing a table of correspondence of at least one of character strings and numbers that express identification

codes, and a corresponding signal sequence among the plurality of said signal sequences.

4. A reproduction equipment as set forth in claim 3, wherein said digital watermark embedding unit embeds a different signal sequence in each of a predetermined unit of said AV signals to be reproduced.

5. A reproduction equipment as set forth in claim 4, wherein said digital watermark embedding unit embeds a plurality of signal sequences, to be embedded as the digital watermark, randomly at a same proportion per fixed time in said AV signals to be reproduced.

6. A reproduction equipment as set forth in claim 1, wherein said plurality of signal sequences are signal sequences with which cross correlation values are smaller than a previously set threshold value.

7. The reproduction equipment as set forth in claim 1, further comprising a unit operable to record a copy of said digital watermark-embedded AV signals.

8. A reproduction equipment specifying equipment comprising:
an input unit operable to input AV signals containing a binary bit string, each position of a specific value bit of the binary bit string indicating a corresponding signal sequence among a plurality of signal sequences of the same contents as that of a reproduction equipment, the binary bit string being embedded in the AV signals as a digital watermark;
a signal sequences recording unit operable to record the plurality of signal sequences;
a correlation value calculation unit operable to calculate correlation values of the AV signals and all of said signal sequences recorded by said signal sequence recording unit and further operable to output a maximum correlation value among correlation values obtained;
a threshold value setting unit operable to set a threshold value for said correlation values;
a comparison unit operable to compare said maximum correlation value with said threshold, and further operable to output a one of said plurality of signal sequences for which said maximum correlation value exceeds said threshold value;
an identification code judgment unit operable to determine an identification code in accordance to the one of said signal sequences output from said comparison unit; and
an identification code output unit operable to output said identification code.

9. A reproduction method, comprising:
inputting coded AV signals;
decoding said coded AV signals to generate coded AV signals to be reproduced;
generating an identification code;
converting the identification code into a binary bit string, each position of a specific value bit of the binary bit string indicating a corresponding signal sequence among a plurality of signal sequences;
embedding the binary bit string as a digital watermark into said AV signals to be reproduced, wherein digital watermark-embedded AV signals are generated; and
outputting said digital watermark-embedded AV signals.

10. A reproduction method as set forth in claim 9, wherein said identification code is at least one of an equipment ID of a reproduction equipment, a card ID of an IC card connected to said reproduction equipment, a user ID of a user of the reproduction equipment, a raw material ID of said coded AV signals, a medium ID of a recording medium in which said

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coded AV signals are stored, a reproduction date and time, and an initial value of a signal sequence to be embedded among the plurality of signal sequences as said digital watermark.

11. A reproduction method as set forth in claim 9, wherein the plurality of signal sequences are signal sequences having cross correlation values that are smaller than a previously set threshold value.

12. A reproduction method as set forth in claim 9, wherein the step of embedding includes embedding a different signal sequence in each of a predetermined unit of the AV signals to be reproduced.

13. A reproduction method as set forth in claim 12, wherein the step of embedding includes embedding said plurality of signal sequences randomly at the same proportions per fixed time in said AV signals to be reproduced.

14. A recording medium, in which watermark-embedded AV signals are recorded by the reproduction method of claim 9.

15. A reproduction equipment specifying method, comprising:

inputting AV signals containing a binary bit string, each position of a specific value bit of the binary bit string indicating a corresponding signal sequence among a plurality of signal sequences of the same contents as that of a reproduction equipment, the binary bit string being embedded in the AV signals as a digital watermark;

recording the plurality of signal sequences;

calculating correlation values of the input AV signals and all of the plurality of signal sequences to output a maximum correlation value among said correlation values obtained;

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setting a threshold value for said correlation values;

comparing said maximum correlation value with said threshold value to output a one of said plurality of signal sequences for which said maximum correlation value exceeds said threshold value;

determining an identification code in accordance with said one of said signal sequences; and

outputting said identification code.

16. A medium, in which a reproduction equipment specifying program is recorded, comprising:

inputting AV signals containing a binary bit string, each position of a specific value bit of the binary bit string indicating a corresponding signal sequence among a plurality of signal sequences of the same contents as that of a reproduction equipment, the binary bit string being embedded in the AV signals as a digital watermark;

recording the plurality of signal sequences;

calculating correlation values of the input AV signals and all of the plurality of signal sequences and outputting a maximum correlation value among said correlation values obtained;

setting a threshold value for said correlation values;

comparing said maximum correlation value with the threshold value to output a one of the plurality of signal sequence for which said maximum correlation value exceeds said threshold value;

determining an identification code in accordance with said one of the signal sequences and said correspondence table; and

outputting said identification code.

* * * * *